

## CASES OF OPERATION IN SPINA BIFIDA AND ENCEPHALOCELE, WITH REMARKS.

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At our last meeting Dr. J. W. White, in his able paper on the Surgery of the Spine, speaking of the operative treatment of spina bifida, presented the conclusion arrived at by the Committee of the Clinical Society of London, as that held by most surgeons of the present day. This is: "That while various successes have been reported by other methods such as simple tapping and drainage, and more recently in a limited number of cases by excision of the sac, yet on the whole the method of injection of the sac offers the best prospect of ultimate recovery with the least immediate danger."

This is an opinion unquestionably justified by the facts as they stand at present.

The operative treatment of spina bifida and encephalocele by incision has always been viewed with great disfavor. Treves says of spina bifida: "These operations can only be undertaken in those comparatively infrequent cases where the sac is quite free from either the cord or any of the spinal nerves." And again: "The modus operandi is of little moment. If the sac contains cord elements, the result will prove fatal."

In encephalocele he says that an operation is only to be considered when rupture of the sac is imminent, and then he recommends tapping with the subsequent application of pressure.

It is to be remembered, however, that constant improvement is being made in the results of operation on the nervous system. And many of the facts upon which these opinions were based were collected at a time when asepsis was not so generally obtained in operative work as at present.

It seems to me, therefore, important to accumulate as much recent experience as possible upon which to form our modern

views of this subject, and it is as a contribution in this direction that I make a report of the few cases I have had.

#### CASES OF SPINA BIFIDA.

*Case 1.*—Lillian F., aged nineteen months, was brought to the Massachusetts General Hospital on July 9, 1886. She had a tumor over the sacro-lumbar region of the spine, which was about double the size of the child's fist. The tumor was elastic, fluctuating, translucent, with a tendency to be pedunculated, the pedicle being about two inches wide. No perceptible change occurred in the tumor when the child cried. The skin covering the tumor was normal in character around the base, somewhat thinned as the summit was approached, and on the top was a small ulcerating surface.

The legs were paralyzed, and in a somewhat spastic condition, it being difficult to separate them; and the child seemed to have no control over her water. With this exception, she seemed in every way normal.

The history was, that at birth the tumor was about the size of a hen's egg, but that after three months it began to grow, and at the time of entrance was double the original size. The fact that the tumor was still increasing in size and beginning to show a tendency to ulcerate on the surface, together with the evidence that communication with the spine was certainly not free, made an operation seem advisable.

This was accordingly done on July 12th, 1886. With the object of preventing any unnecessary loss of cerebro-spinal fluid, a Spencer-Wells clamp was applied to the pedicle and gradually tightened as the fluid was allowed to flow out of the cyst. Skin flaps were then dissected up, and the tumor was cut off close down to the spine. The stump made by the division of the cyst was sewed across to and fro with catgut, and the skin was then brought together over it with silk sutures, the clamp being taken off as soon as the wound was tightly closed. The opening into the bony canal in this case was small and could be made out with difficulty; it was certainly not larger than the tip of the little finger.

The child recovered well from the ether, although it was rather restless for a day or two. On the second day the bandages were stained with serum, and on opening the dressing it was found that this serous fluid oozed from some of the stitch holes. The wound healed well by first intention, but this leakage of serous fluid continued for more than a fortnight. It then ceased, however, and when the child was seen, more than a month later, everything was closed.

The sac of the tumor was much trabeculated, and divided into separate chambers. It being summer and difficult to get pathological work done, no proper examination was made of it. I am, therefore, unable to say whether it contained nerve elements or not. An examination was made of the fluid that flowed away after the operation, and its character was found to be that of cerebro-spinal fluid.

This case was heard from in May, 1892. The back had remained entirely well since the operation, but the child had gained no power in the legs, and had not gained any control over the urine.

*Case II.*—Cora W., aged four years, was seen November 26, 1887. She was a well-nourished child, fully developed except that the legs were almost wholly paralyzed, a very slight amount of motion being preserved in the right one. She had never used them, being unable even to creep. She had full power over the bladder and the rectum. Her head was somewhat large, with a bulging forehead, rather narrow, laterally. The child appeared stupid, but her parents declared her to be bright and intelligent.

Over the lumbo-sacral region was a tumor,  $13\frac{1}{2}$  inches in circumference at the base. As it was somewhat pedunculated, its circumference nearer the top was  $14\frac{1}{2}$  inches. It was tense, translucent to transmitted light, and with a strong light no solid portion could be made out. It was covered with true skin, but this was very thin over the apex, and was there adherent to the wall of the cyst below. Nearer the base the skin was thicker, and not attached to the cyst. The surface was congested, almost ulcerating, with a serous exudation. The tumor was not tender and gave no pain upon handling. Laughing and coughing did not increase its tension.

The child was brought from Kansas, where her home was on the prairie at a distance from any medical advice, and as the tumor was growing and beginning to show a tendency to ulcerate on the surface, the parents desired that something should be done which would remove the danger of rupture, and clearly understanding the danger of the operation, they wished that the removal of the sac should be attempted. This was accordingly done on December 5, 1887.

A special clamp was made to compress the pedicle of the tumor during the operation and thus prevent the escape of cerebro-spinal fluid. It worked satisfactorily, and no fluid was lost during the operation. It was impossible, however, to entirely remove the sac, a considerable portion of its wall being left close against the spine. The thinner portions of its wall were, however, entirely cut away, down

to where the skin was thick and of a normal character. The sac was multilocular; the fluid contained was clear and estimated at two pints. The edges of the sac were sewed with catgut, and the skin was brought together with silk.

The recovery from ether was satisfactory, with very little vomiting. The child took milk as soon as she was able to swallow, and suffered but little pain.

The second day there was some accumulation of fluid in that portion of the sac that was left, and a slight amount of leakage from the lower part of the wound. The temperature, immediately after the operation, reached 100.8° F., but the following morning it had fallen to 100° F., and the fourth day it came down to 99.4° F., being 98.6° F. that evening. Up to this time the child seemed to be doing well in every respect, except that the escape of fluid still continued.

On the morning of the fifth day the temperature was 98° F., the condition of the child seemed good, and she was taking nourishment well. Towards evening, however, she became quite restless, and did not care for her milk and presently the hands and feet became cold. Towards midnight it was noticed that the muscles of the neck and back had become very rigid, and this condition continued without active convulsions. On the morning of the sixth day, with the gradual failure of strength, the pulse and temperature rose, the latter reaching 101.6° F. The child died that morning. No autopsy was allowed.

The examination of what was removed in this case showed the presence of considerable nerve trunks on the walls of the sac.

These two cases are the only ones in which I have operated for spina bifida, and the results are certainly not favorable to the operation. In the first, encouraged by the evidence that the communication with the spinal canal was small, the operation was done with a strong hope of success, and the result justified this expectation, as far at least, as the survival of the child went. It is to be regretted that no careful histological examination of the tumor was made. Follin and Duplay found nerve elements present in five-sixths of all cases, and the paralysis of the child, which has become more manifest as it has grown up, makes it probable that the spinal cord or its nerves were more implicated in this tumor than was at first supposed.

In the second case we had a very different condition. The sac was large, threatened rupture, and freely communicated with

the spinal canal. A rupture at a distance from medical aid would almost certainly cause speedy death. There was little doubt that the cauda equina entered the sac. The persistence of paralysis for four years did not encourage the hope of any considerable restoration of function. The case belonged to that class in which operation has most commonly failed.

At the same time, the child was in good general condition. The nerves included in the sac did not preside over any vital function, and there was sufficient sound skin around the base of the tumor to cover the defect after all the thinner portion of the cyst that threatened ulceration had been removed. It seemed possible, therefore, that if the operation was made perfectly aseptic, it might be successful. Without an autopsy it is hard to satisfactorily explain the fatal issue.

In these cases especial care was taken to prevent the loss of cerebro-spinal fluid during the operation. Later experience of operations in the spinal cord seems to show that this is a needless precaution, as the fluid escaping during such an operation does not appear to affect the nervous centres injuriously. In answer to a question, Mr. Horsley writes me that he regards the loss of cerebro-spinal fluid during operation a matter of no importance whatever.

On the other hand, I think it important to close the wound after operating so closely that leakage of the spinal fluid shall not continue. For, first, it seems not improbable that a continuous and considerable loss of this fluid may seriously alter the internal pressure in the cord and brain; and secondly, the constant wetting of the dressings makes it extremely difficult to keep them thoroughly aseptic, and if the area about the wound once becomes infected, the extension of the inflammation inwards may be very rapid.

In my second case there may have been extending inflammation of the cord, but in the absence of outward signs of inflammation about the wound, and with no characteristic signs of spinal irritation, it seems more probable that the constant drain of the cerebro-spinal fluid injuriously affected the internal pressure in the cord and brain. I should certainly in another case take even more pains to tightly close the wound against the possibility of leakage.

The plan of operation in both of these cases was rude, and was largely dominated by the fear of an imaginary danger from the immediate loss of cerebro-spinal fluid. With this fear laid aside, the operation planned by Bayer should be carried out, if the case permits.

He makes an opening in the side of the sac, in order to avoid injury of the nerves. He then cuts off those nerves that end in the wall of the sac, and freeing those that run through the sac, replaces them within the spinal canal when possible. If the opening is small enough he closes it by ligature, for which he uses catgut. Fearing inflammatory extension through secondary fistulae, he closes any point of leakage as soon as possible after it appears.

He has operated thus upon five cases, of which three were successful.

*Case III. Encephalocele. Operation. Recovery.*—Mary Ann H., a child of eight months, was brought to the Massachusetts General Hospital on June 11, 1891, and entered under the care of Dr. John Homans. On the first of July, at the change of service, I took charge of her. She had a tumor on the back of the head, which had existed since birth, being at that time small and having gradually grown until, at the time of entrance, it was about the size of a small orange, decidedly pedunculated. It was everywhere covered with normal skin, but this was very thin over the upper part of it. The child had never had any symptoms of cerebral trouble, and there was only a very slight tenderness over the tumor. Pressure could not diminish the size of the tumor, which was translucent and fluctuating, but did not pulsate. Examination under a high light did not show any especially solid portion in the pedicle. The opening in the skull was made out to be about large enough to admit the tip of the forefinger.

During the month of June this cystic tumor was injected three times with Morton's solution of iodine, each time being previously emptied through a trocar. The fluid that was drawn off was clear, slightly yellow and albuminous. After each treatment the tumor rapidly refilled and quickly reached its former size. These injections were repeated three times in July, but all without the least effect in diminishing its size or bringing about any hardening. On August 5th, as no gain had been made by treatment, it was decided to operate.

The condition being evidently, in part at least, a hernia of the membranes of the brain, the skin was dissected off it upon the sides, making flaps that would come together, and the tumor was amputated close down to the skull, after the pedicle had been ligatured with catgut. There was very little leakage from the wound, and there was no difficulty in closing the flaps tightly over the stump. A dry dressing was applied and the patient made a rapid and uninterrupted recovery, without ever developing any symptoms of nerve irritation.

Dr. W. F. Whitney made an examination of this tumor and found that it consisted outwardly of a sac covered by skin. Beneath this was a fibrous layer, externally well vascularized, which recalled in its histological character the pia mater. Adherent to this were fragments of tissue, the peculiar folded character of which recalled the structure of the cerebellum, and this impression was strengthened by the similarity of cellular arrangement, although the large ganglion cells [Purkinje's] could not be found. In a few of the small pieces removed separately the cerebellar structure was even more marked. The growth was a cerebellar encephalocele.

In Sajous' Annual for 1889, Senn has collected four cases of similar operation for meningocele, with but one death. In the absence of a pathological report of these cases, it is possible that in some of them portions of brain tissue may have been present in the walls of the cyst.

The instances of the removal of tumors shown to be encephalocele are few, too few to enable us to decide the rate of mortality for the operation, but a sufficient proportion of them have been successful to show that in a good share of cases the survival of the patient may be looked for, provided the operation is conducted aseptically. *A fortiori*, the same is true of meningocele.

The failure of any good result from the injection of iodine in this last case is entirely in accord with what has been elsewhere observed in these tumors of the cerebral meninges.

The following extracts from a personal letter from Mr. Horsley, in regard to the treatment of this class of cases, will be of interest:

"In most cases of cephalic meningocele, I believe that, if taken early, they could be cured by compression, as Lallemand's original case was in the last century."

Speaking of later cases, he says: "As regards cephalic meningocele, I think, where practicable, it should be excised, if, as in one case I had, it is situated at the nasal suture. I think, with a view of avoiding sepsis, it can, as I have shown, be very readily treated by electrolysis. As regards cases in which encephalocele exists, I quite agree that the projecting portions of brain substance had better be excised, as in a very severe case which I published some years ago in Brain, in which I tried to cover over the projecting mass, the result was unsuccessful; and, considering the abnormality which such portions of the encephalon exhibit, I think they are not worth preserving."